Where Diagnostic Medicine is Headed: The Future Lies Within the Cell

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Objectives
- Discuss factors that are accelerating changes in the delivery of health care
- Explore the implications for pathology and cytology
- Identify what we can do to enhance our value to patients and the healthcare system

New Frontiers Lecture
“`The frontiersmen were the true dreamers of the nation. They really were the possessors of a national vision. Not statesmen but riflemen and riders made America. The noblest conclusions of history still rest upon premises which they laid. But, in its broadest significance, the frontier knows no country. It lies also in other lands and in other times than our own. When and what was the Great Frontier? We need go back only to the time of Drake and the sea-dogs, the Elizabethan Age, when all North America was a frontier, almost wholly unknown, compellingly alluring to all bold men. That was the day of new stirrings in the human heart.”

Why am I here? Preach a Theme
- Lecture
  - From Wikipedia, the free encyclopedia
  - A lecture is an oral presentation intended to present information or teach people about a particular subject. A politician's speech, a minister's sermon, or even a businessman's sales presentation
  - Though lectures are much criticized universities have not yet found practical alternative teaching methods for the large majority of their courses. Lectures delivered by talented speakers can be highly stimulating; at the very least, lectures have survived in academia as a quick, cheap and efficient way of introducing large numbers of students to a particular idea or field of study.
  - Lectures have a long history in churches, community center, libraries, museums, and other organizations have hosted lectures in furtherance of their missions or their constituents' interests.

Conflict of interest
The following speaker stated they had no relevant financial relationships with commercial interests:
Jared N. Schwartz, MD, PhD
What is driving the anxiety over the opportunities for pathologists and cytotechnologists?

Are we fighting the ‘boogeyman’ in the closet?

Yes We Are!

Example: For years, the telephone served only one purpose: Talking

Design improvements enhanced audio communication and extended distance ranges

New functionality expanded the value of the phone: conference calls, caller ID, video, mobility

Today, the phone is no longer primarily an audio communication device; we have picture phones, multimedia video messaging and 3G/4G. It is hard to remember life without these capabilities!!!

Message to the whole of pathology: “United we stand, divided we fall”

- All of pathology is impacted by the same trends.
- New knowledge and technologies are breaking down the barriers of all of our artificially created barriers

Are we just glorified technicians?

“What happens at the moment is that a surgeon roots around inside a patient, removes as much tumour as he can find, and hopes he got it all. He then sends what he has excised to a laboratory, where a technician checks the sample all around the outside of the extracted mass to see if it is encapsulated by healthy tissue.”
Apology: We would like to apologise to the world’s pathologists for suggesting that the histological examination of excised tumours is carried out by “technicians”, as suggested last week in “Illuminating surgery”. The pathologists who perform this work are, of course, physicians who specialise in examination of tissue samples.

- A rapid uptake in clinical practice of new molecular assays for primary diagnosis of a growing number of cancers
  - Use of computer-aided diagnosis of the image, or pattern recognition features to guide the pathologists to a very precise answer
  - Less reliance on the microscope as the primary tool; more cancer cases diagnosed using a combination of standard microscopy and other assays or techniques
- Revolutionary changes in the histology laboratory will finally address the variability in the quality of specimen processing and preparation—both within a histology laboratory and across other histology laboratories within a region
  - Use of Lean and similar work flow optimization methods in support of histology automation solutions

Optical Diagnosis of Colon Polyps Deemed Feasible

“Dispensing with formal histopathology for most small polyps found at colonoscopy could improve the efficiency of the procedure and lead to substantial savings in time and cost.” Ana Ignjatovic, BMBCh, St. Mark’s Hospital in Middlesex, England and colleagues concluded in an article published online in The Lancet Oncology

“Perceived” Threats in Cytology

- Vaccines
- Automation
- Molecular methods including proteomics
- Smaller specimens
- In vivo and in vitro imaging and biomarkers
- School closings
- Plenty of others….

Fear of the Vaccine: Gardasil

“…the incidence of cervical cancer in the U.S. is already so low that “even if we get the vaccine and continue PAP screening, we will not lower the rate of cervical cancer in the U.S.” …conventional treatment and preventative measures are already cutting the cervical cancer rate by four percent a year. Even if 70 percent of women get the shot and required boosters over the same time period, which is highly unlikely, Harper says Gardasil still could not claim to do as much as traditional care is already doing.”

Realities: NOW and LATER?

Why do we view these new “things” with fear

- Although current methods are still common and effective
  - HPV vaccines will continue to improve and that is good
  - In the medium/long term, screening will not totally go away
- Molecular and quantitative methods are an opportunity, and if not accepted now:
  - Cytology as a subspecialty will fade away.
  - Cytologic characteristics will continue to be used to narrow diagnosis
  - But increasing use of ancillary tools such as IHC, molecular methods, cytogenetics, and gene profiling will determine the diagnosis for most serious diagnostic problems
What is the unique value we bring to the patient?

- Try and describe that in one sentence
- New Frontiers really means starting over
- Cytology is the "study of the cell"
- Cytology is not just morphology
- Cytology is trying to understand the cell and I would add its contents
- What we do is study the cell and based on that analysis we make diagnostic decisions and will increasingly determine prognosis and therapy

So What are Cytopathologists

- The reality is our value to patient care is increasing so fast with all these new modalities that it has initiated a common phenomena: first fear, then anxiety, then doubt, then wonder, then excitement, then enthusiastic acceptance
- Cytology is Pathology
- Pathology is Medicine
- **Cytopathologists are:**
  - Physicians who study the cell for evidence of disease and in addition have tools to determine prognosis and recommend treatment options

Labor shortages are not unique to the US

- Through a contract with the Irish National Cancer Screening Service (NCSS), Quest Diagnostics will provide quality-assured screening services intended to improve medical outcomes and reduce anxiety wait time for women ages 25 to 60 who participate in Ireland’s first nationwide cytology-screening program...

Realities

**Market forces will swing the pendulum**

- Labor shortages?
  - Aging workforce; insufficient supply of cytotechnologists?
  - Changing lifestyle expectations?
  - More choices for women
  - Cytotechnology program closures
  - Demands for higher quality
- Regardless of the healthcare reform solution, millions of people will be added to the health care system
  - Focus on screening for early disease at cellular level
  - More things to do with same cellular specimen

So What does this mean for us?

- Electronic keys that control locks, windows, aircon/heating and ignition
- Hi tech security systems
- On board computers for everything from engine checks to oil changes
- Bluetooth cellphone
- Automated cruise control
- Ambient air/heating controls
- Audio stereo systems—DVDs, radios, tape deck
- GPS

The days of the ‘self-made car mechanics’ are long gone
Specially trained and certified engineers

- Specialty training
- Required certifications
- Career path
- Increased compensation
- Increased job security
- Status, recognition and career pride

...and requires that we relearn the principles of teamwork

Effective, safe care requires more than just a pilot

First, we must we play together

What are the implications for your future? GREAT!

**Cytotechnologists**

- Locator skills
- Patience
- Strict adherence to process
- Professionalism
- Knowledge
- Closer patient connection
- Pre-analytic and post-analytic quality focus
- Efficiency
- Teamwork
- Curiosity

What are the implications for your future? GREAT!

**Cytopathologists**

- Ability to use knowledge of tissue patterns, new technologies and clinical understanding to enhance all information from study of cells
- Medical knowledge
- Clinical knowledge
- Closer Patient Contact
- Pre-analytic and post-analytic quality focus
- Clinical-Pathologic correlation through conferences, tumor boards, etc
- Curiosity
- Teamwork
What new tasks should we consider? Make your own list

- “Image experts”
- IHC / FISH / CISH screening—not only of cells but of tissue also, as these become routinely performed on image instruments
- IHC movement from qualitative to quantitative will enhance opportunities for those who specialize in cellular characteristics of normal, atypical, or malignant cells
- Screening of special stains for microorganisms on tissue
- Use of locator skills saves time for pathologists—and Cytotechs are (much) better at it

All things cellular

- Why are circulating tumor cell technology or flow cytometry not considered legitimate tools for Cytology?
- Why do we duplicate body fluid cell analysis in multiple labs?
- Why are we fixated on one fixative or a couple stains?
- Why are molecular methods not part of cytology now?

What models exist?

- Microbiologist (Virologist)
- Cell culture
- DFA
- Shell vials
- PCR

- Some microbiology labs are 60%-70% molecular, but the people who work there are microbiologists

Think outside the box

- Ultrasound / more aggressive activities
- Promotion of CT autopsies and minimal invasive cytology

Be curious and experiment

- Develop some connection to patients
- Understand the impact of your work—you are vital to quality patient care
- Follow interesting cases, understand the outcomes
- Investigate new technologies—assume accountability; don’t wait for others to ask

Who is going to drive how health care is actually delivered?

“Medicine has changed before, after all. When it did, government policy played a role. But much of the impetus came from inside the profession. Doctors helped change other doctors.”

New York Times Magazine
November 2009
“...once a treatment enters the mainstream—once we know whether it works in certain situations—science is largely left behind. The next questions—when to use it and on which patients—become matters of judgment, not measurement. The decision is, once again, left to a doctor’s informed intuition.”

New York Times Magazine
November 2009

“The health care debate of 2009 has had so many moving parts that it has sometimes seemed impossible to follow. The crisis behind the debate, though, is about one thing above all: the scattershot nature of American medicine. The fee-for-service payment system—combined with our own instincts as patients—encourages ever more testing and treatments. We’re not sure which ones make a difference, but we keep on getting them, and costs keep rising.”

New York Times Magazine
November 2009

“The economic incentives in health care are still pointing in the other direction. As long as doctors and hospitals are paid for each extra test and treatment, they will err on the side of more care and not always better care. No doctor or no single hospital can change that. It requires action by the government.”

New York Times Magazine
November 2009

“Never forget that it is not a pneumonia, but a person who is your patient. Not a typhoid fever, but a typhoid patient”

~ William Withey Gull

Pathology’s Value Proposition

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Cells are the future focus
You are in a unique position armed with unique skills
Teamwork, not turf wars will expand your opportunities
Optimism is critical to success
Leadership and professionalism
Pen-mindedness – have a FRONTIERS vision
Get going now – be proactive, not reactive
You are the only one who will make it happen
The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn.

~Alvin Toffler